

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

THIS PAGE BLANK (USPTO)



Europäisches Patentamt
European Patent Office
Office européen des brevets

Publication number:

**0 389 734
A1**

①

EUROPEAN PATENT APPLICATION

② Application number: 89830135.3

⑤ Int. Cl.⁵ B29B 17/02, B03B 9/06

③ Date of filing: 28.03.89

④ Date of publication of application:
03.10.90 Bulletin 90/40

⑦ Applicant: GOVONI SPA
Via Bondenese, 12
Casumaro Ferrara(IT)

⑧ Designated Contracting States:
AT BE CH DE ES FR GB GR IT LI LU NL SE

⑧ Inventor: Gulmini, Carlo
via Ex-dogana 7
Casumaro (Ferrera)(IT)

⑦ Representative: Sassatelli, Franco T., Dr.
c/o INIP via Ruggi 5
I-40137 Bologna(IT)

⑤ Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers.

⑤ The device foresees a selecting cycle in which the pressed bodies are separated from the plugs on a turning drum (4), whereas the empty containers, on another line, are pressed in a group of squeeze roll (7). From the above lines, the recovered bodies at first reach a volumetrical dosing device and, subsequently, a manipulator (15) with turning suction cups which transfers and singularizes them on a belt conveyor (16) with sectors. The bodies set in a forward motion according to their largest size subsequently reach a station (17) for recognizing the material type and another station (15) for the colour recognizing. After this diversifying action, the bodies reach the stocking compartment for the homogeneous materials suitable for immediate re-using.

EP 0 389 734 A1

"Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers".

For the surrounding protection and the waste material recovering, at present the exigency is felt of carrying out a selection and a recycling of the empty containers in plastic materials. The present invention is particularly used in centres for the distribution, for instance foodstuffs, where the necessity may be felt of collecting empty used containers, such as bottles, cans and similar taking into account the users' necessity of a renewed supply of the same product.

The system can be used to operate either with empty containers or with already pressed recovered bodies. This operational versatility allows to use the system either before the recycling phase - thus carrying out the preliminary selection of empty containers - or after the squeezing phase, thus by operating on the recovered bodies, or by conjointly operating the treatment on both bodies.

The equipment uses initial loading devices for the collection bags as well as for cleaning, to separate the recovered bodies from their plugs. From a receiver, these bodies subsequently arrive at a dosing device and, at last, they reach a manipulator which transfers them on a sector belt conveyor. The body then reaches some stations for recognizing the type and colour of the plastic material. Therefore, a homogenous composition of the material is reached which has been differently selected and can then directly used again.

The operational cycle foresees to introduce the already pressed recovered material contained in bags 1 into hopper 2. From this one, on line 3 they reach a cleaning device with a turning drum 4 which separates the pressed from the plugs. The still entire empty containers, on the contrary, are charged into hopper 5 and, on line 6, sent to a group of squeeze roll with couple of roller 7. The recovered squeezed bodies then fall, through the hopper 8, on the turning drum 4 which feeds a receiver 9 fitted with a high level bearing circle 10. By means of the volumetric dosing device 11, a transportation line 12 is fed which brings to the vibrating alignment hopper 13 to discharge the squeezed bodies, in alignment according to their longest size, on line 14. This line brings the bodies towards the manipulator 15 fitted with turning suction cups, which transfers the pressed, singularized and trimmed bodies on sector ribbon 16. The body is then passed through two detecting stations: station 17 to detect the plastic material type, and station 15 to detect the colour. According to the type of the plastic material and to its colour, which has already been detected in advance, the pressed body is diverted, by suitable swithching device 19,

to the different grinding mills 20 fitted with a device for the loads pneumatic transport on the fixed and mobile stockage means. The whole proceeding is checked by a computerized system. The manipulator 15, fitted with turning suction cups, consists of the turning table 21 which turns in synchrony with the ribbons 14 and 16.

For starting the operation, the arms 22 on the turning table 21 are shifted radially into the captation zone above ribbon 14, and the suction cup holders 23 are lowered which draw the pressed body 24 and lay it on ribbon 16 after a 180° rotation. A suited motor reducer 25 generates the rotation of the turning table 21. An emitting device 26, on the passage of the pressed body, subsequently gives out a beam of electromagnetical waves which are taken into a sensor 28 fitted below the sector ribbon 16. The quality of the waves is analysed by a computerized statistic system 29 which establishes the nature of the plastic material and orders its deviation on the relevant line of the subsequent treatment. The unit uses also a selecting device for the recovered squeezed bodies in plastic material which are selected according to the colour. This enables to separate the squeezed bodies in different colours with an economical advantage for the quantity of the rescued product. This device uses a reading device in "CCD" 30 which analyses the shape of the pressed body 31 and, on points fixed in advance, estimates the frequency of the electromagnetical wave emitted by this body and, consequently, values its colour. This last analysis is carried out by means of electronic sensors which establish the colour of the body, for this operation, a neutral source 32 is fitted below the sliding plane of the ribbon 16.

The keying and selecting unit as mentioned above is illustrated in schematic view by the drawings of tables 1, 2, 3 and 4.

In table 1, fig. 1 is the view of the compartments for loading, cleaning and stocking.

In table 2 fig. 2 is the view of dosing, singularization and type recognizing lines of the plastic material and of its colour, whereas,

fig. 3, the deviation, milling and stocking devices are shown.

Fig. 4 in table 3 is the view from above of the manipulator fitted with turning suction cups 15, while

fig. 5 is the side view of the relevant motorizing assembly.

In table 4, fig. 6 is the front view of the recognizing device for the squeezed plastic materials, which is fitted with an emitter of properly

modulated electromagnetic waves, whereas

fig. 7 is the view of the colour selection phase which is carried out, by means of the reading device 30, on the body arrived in position by means of ribbon 16.

In executions, the system can be, properly suited to the different use requirements and be integrated in different ways, as well as connected with either fixed or mobile stockaging devices of different kinds.

Claims

1) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers, characterized by the fact that distinct parallel working lines are foreseen, namely a separation line of the already squeezed bodies from the plugs, and another line for the squeezing operation, both above lines discharge into only one hopper in order to transfer the bodies to the treatment phases. The recovered bodies coming from the two treatment lines fall through a hopper (8) on a turning drum (4) which sends the bodies into a receiver (9) fitted with a high level bearing circle (10). A volume dosing device (11) feeds then a transport line (12) which puts the bodies into a vibrating alignment hopper (13) to discharge the squeezed bodies and aligns them according to their larger side on another transport line (14). This line then sends the bodies towards a manipulator (15) with turning suction cups which transfers them, while singularizing and tilting them on a sector ribbon (16). This last one lets the bodies pass through two recognizing stations: the one (17) for the plastic type recognizing, and the other (15) to recognize its colour. According to the recognized type of the plastic material and to its colour, both squeezed and the not squeezed bodies are switched by a double deflector (19) to different grinding mills (20) fitted with a pneumatic transporter for the fixed and mobile stockage means all checked by a computerized system.

2) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers, as per claim 1), characterized by the fact that the operation cycle, concerning the separation of the already squeezed bodies from the plugs, at the beginning of the line, foresees the introduction of the squeezed materials, contained in bags (1), into a hopper (2) and sent on a transport line (3) to a cleaning device fitted with a turning drum (4) which separates these with a turning drum (4) which separates these bodies from the squeezed containers.

3) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic ma-

terial container, as per claim 1), characterized by the fact that the operation cycle concerning the squeezing of the integral empty containers at the beginning foresees to load these containers in a hopper (5) and to send them on transport line (6) to a group of squeeze roll (7).

4) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers, as per claim 1), characterized by the fact that the turning suction cups manipulator (15) used in this unity consists of a turning table (21) in synchronism with the belt conveyors (14 and 16). The drawing arms (22), fitted on the said table, are radially displaced in the captation zone above the first belt conveyor (14), the suction cup holders (23) are then lowered which catch the squeezed body (24) and lay it down on the second sector belt conveyor (16) after a 180° rotation by means of a motor reducer (25).

5) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers, as per claim 1), characterized by the fact that an observation station (17) for recognizing the type of the plastic material is foreseen. This station consists both of an emitting device (26), which on the passage of the squeezed body (27) emits a beam of electromagnetic waves of suited length, and of a sensor (28) fitted under the sector belt conveyor (16) which picks the same electromagnetic waves after they have crossed the body. This sensor (28) is connected with a suitable detecting system (29) which, after having examined the features of the received electromagnetic waves, is able to establish the kind of plastic material and, therefore, to address the body to the relevant treatment line.

6) Manipulating and selecting unit for recycling pressed or not bodies obtained from plastic material containers, as per claim 1), characterized by the fact that a station (18) has been foreseen for recognizing the colour of the plastic material. In this station a reading device (30) is used which, by means of proper electronica sensors, analyzes the features of the electromagnetic radiation which has crossed the plastic body when it has been lighted by a neutral light source (32) fitted below the sliding plane of the belt conveyor (16). This analysis, beside discriminating the colour, enables this station (18) to further separate the plastic dark bodies from the light ones.

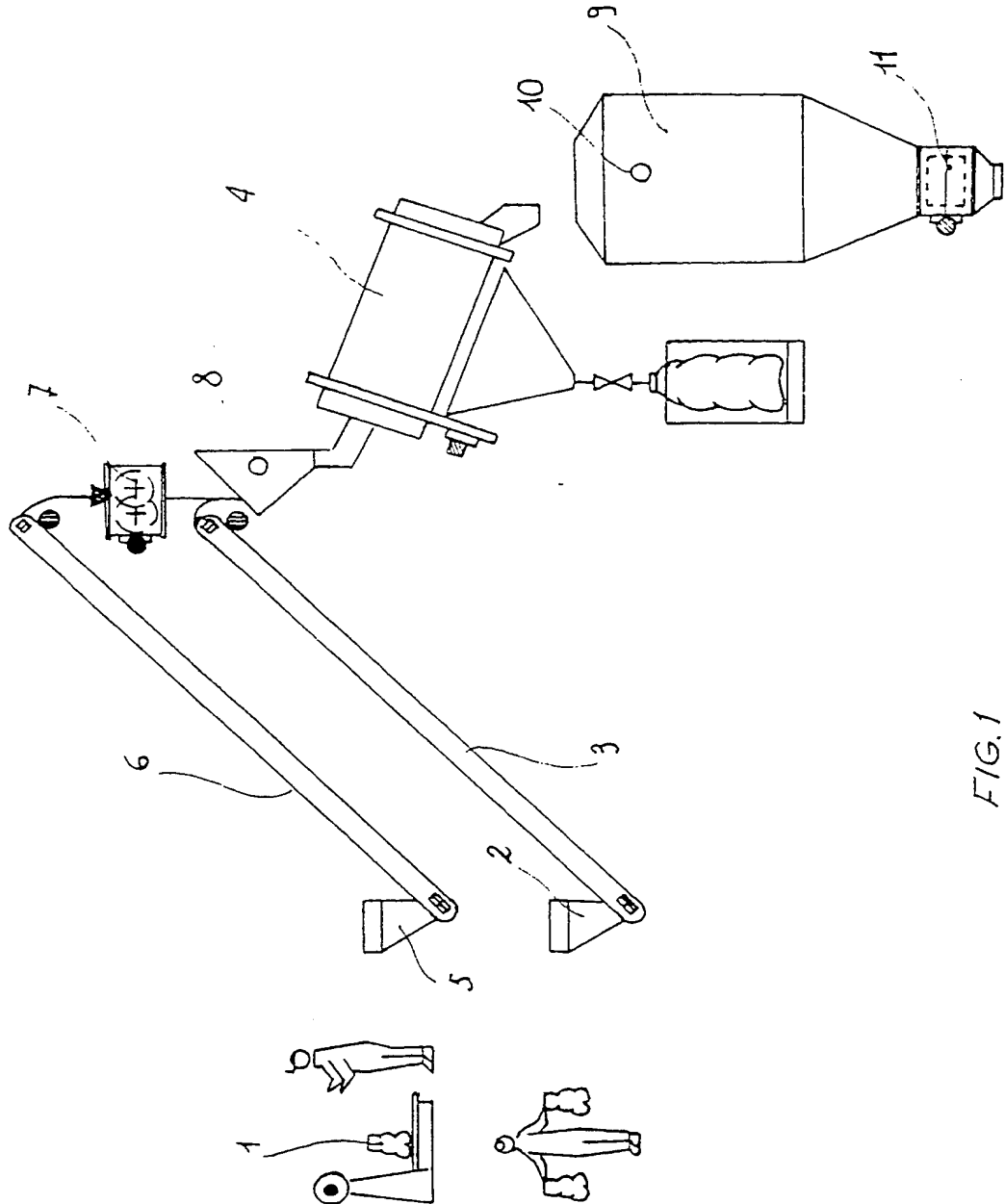
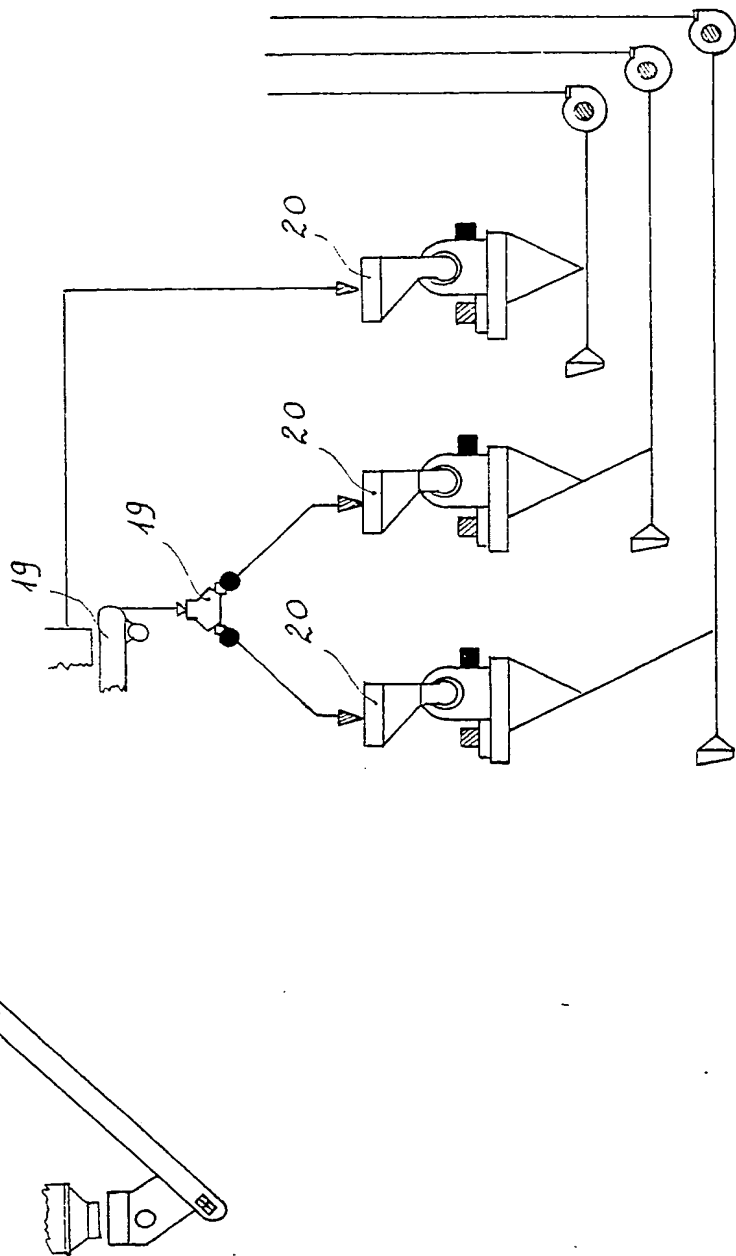
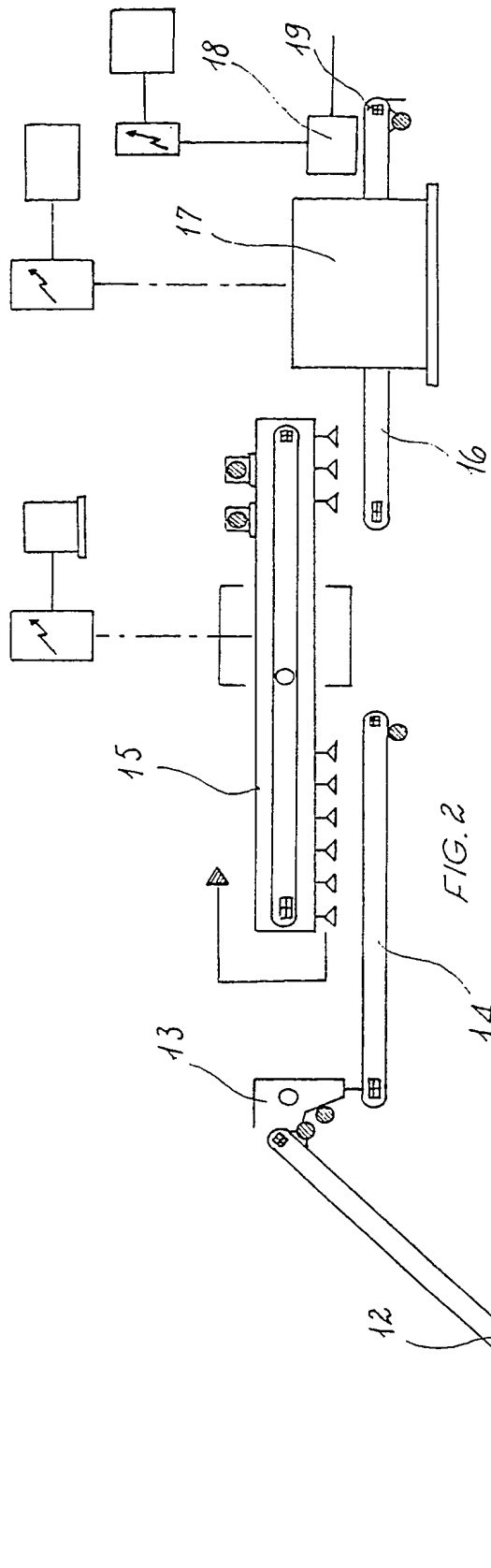


FIG.1



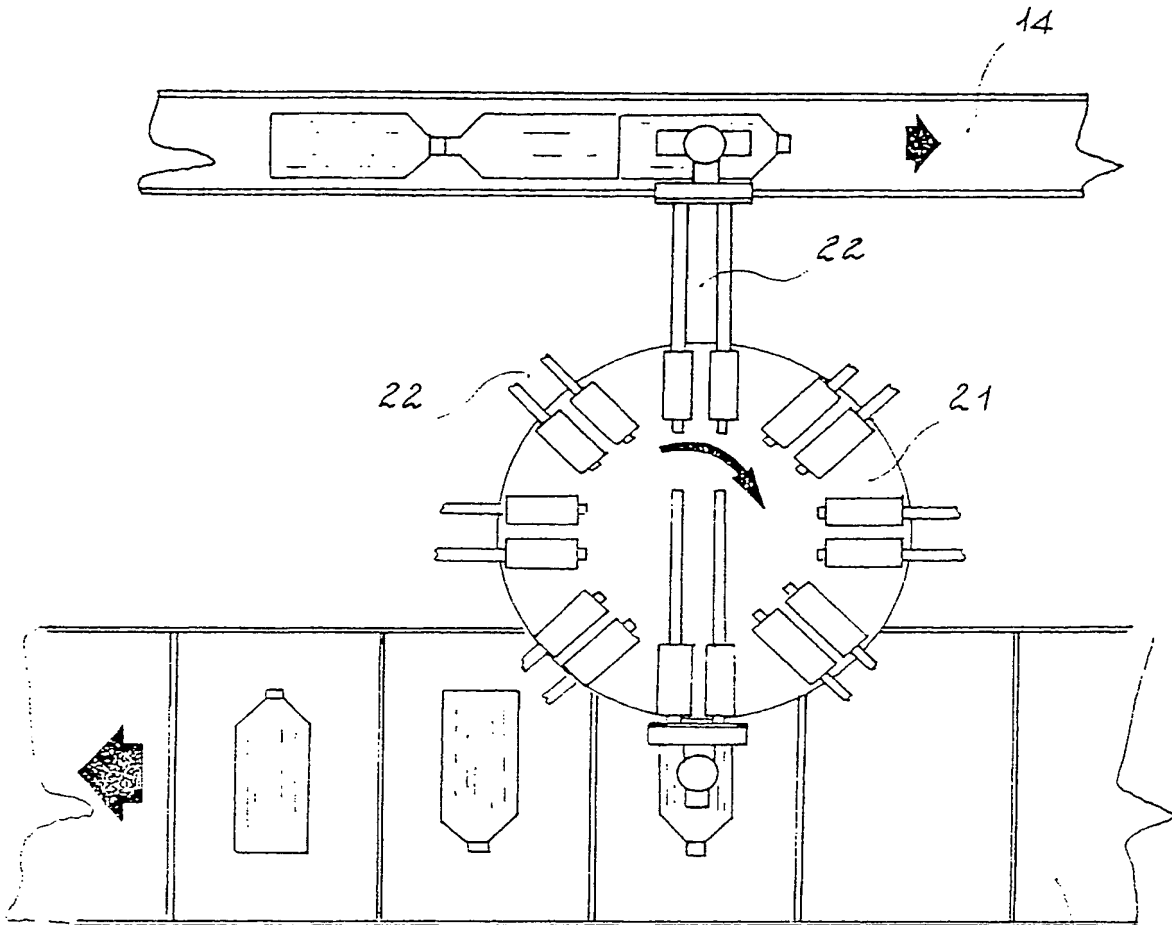


FIG. 4

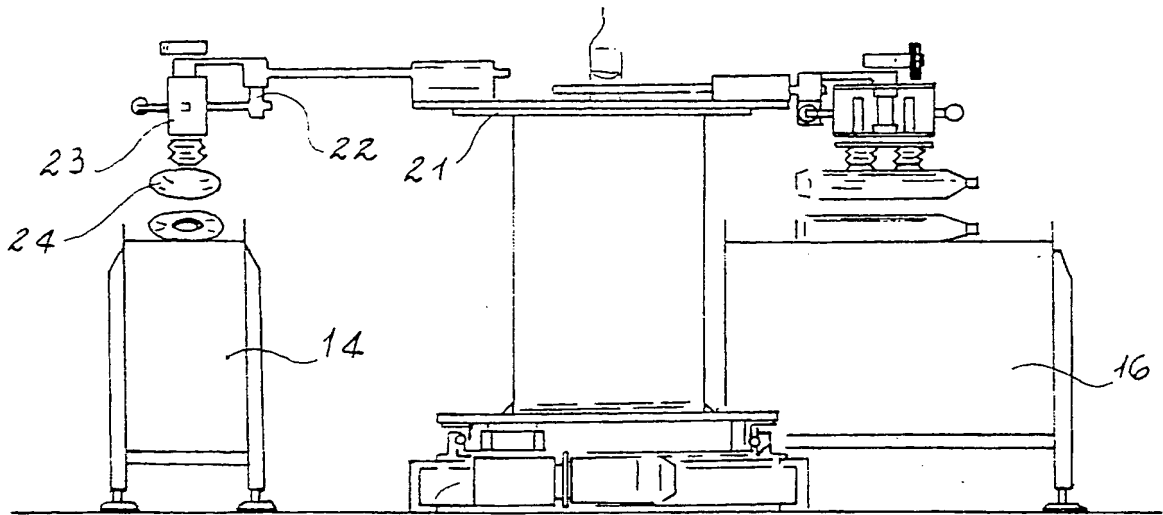


FIG. 5

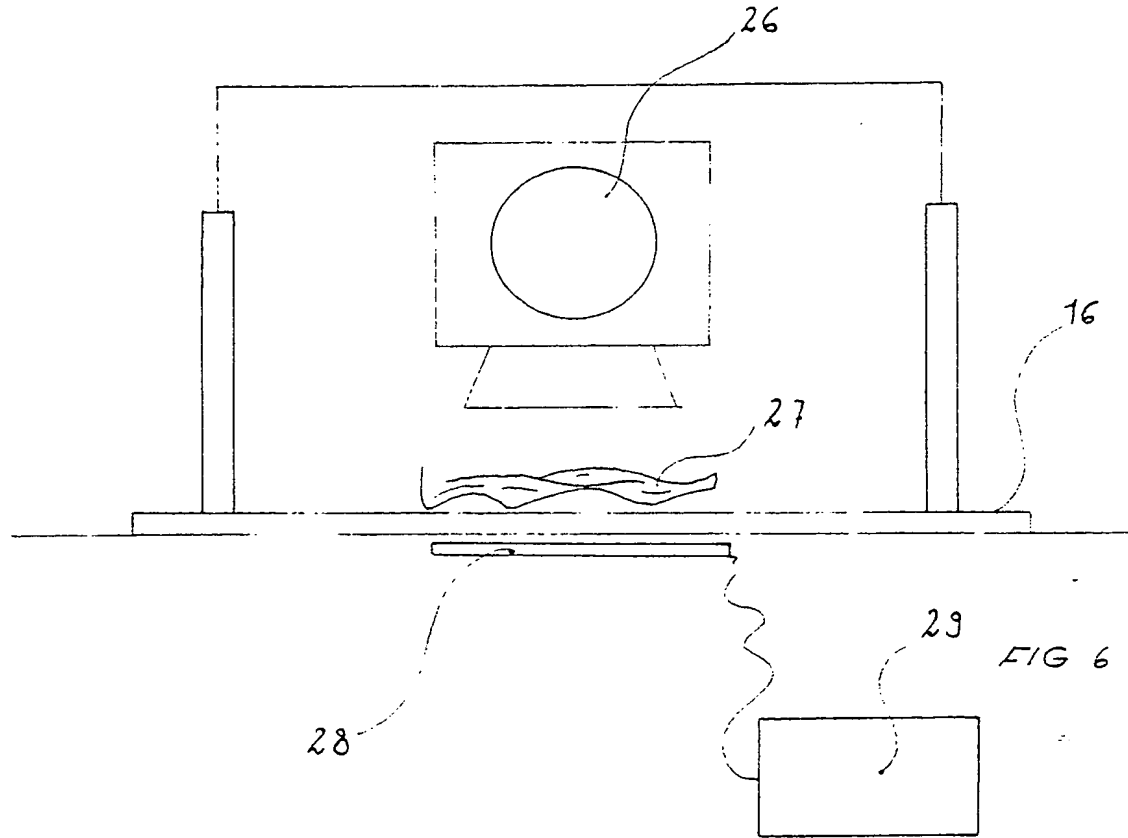


FIG 6

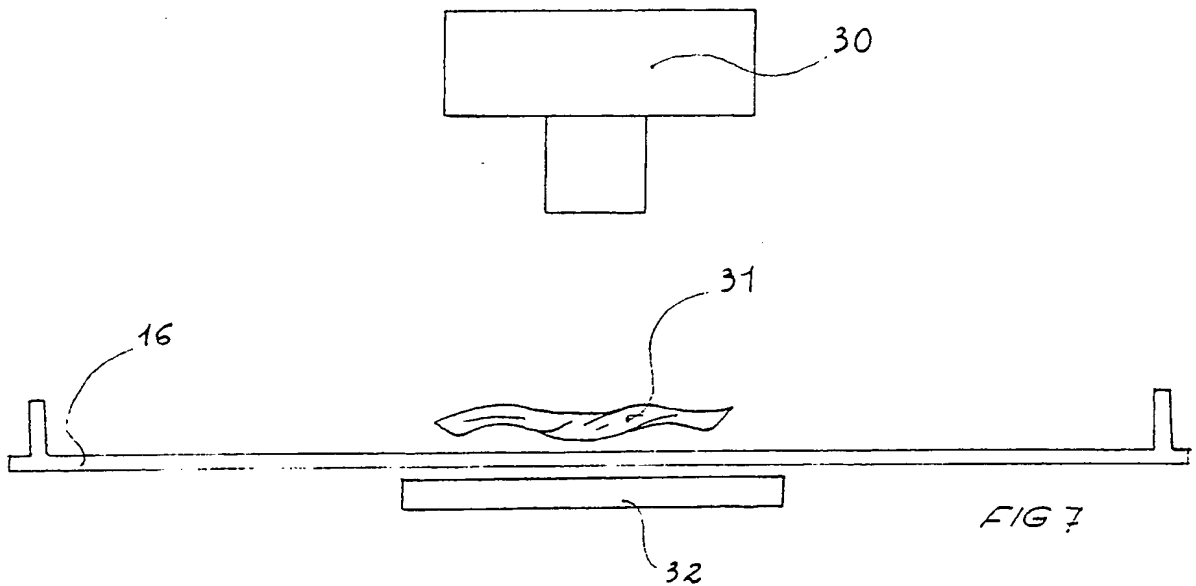


FIG 7



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 83 0135

| DOCUMENTS CONSIDERED TO BE RELEVANT | | | |
|---|---|---|---|
| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl.5) |
| A | DE-A-3 535 633 (HEITKÄMPER) * Figures 1-9 * | 1 | 8 29 B 17/02 8 03 B 9/06 |
| A | DE-A-3 520 486 (THOR) * Figure 1; claims * | 1 | |
| A | US-A-4 715 920 (K.H. RUPPMAN) * Figures 1-10 * | 1 | |
| A | EP-A-0 057 139 (F. CLIN) * Figures 1,2; claims * | 1 | |
| A | US-A-4 418 594 (C.W. BURNS) * Figures 1,2 * | 1 | |
| | | | TECHNICAL FIELDS SEARCHED (Int. Cl.5) |
| | | | 8 29 B 8 03 B |
| The present search report has been drawn up for all claims | | | |
| Place of search THE HAGUE | | Date of completion of the search 14-12-1989 | Examiner KUSARDY R. |
| CATEGORY OF CITED DOCUMENTS | | T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document | |
| X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document | | | |

EPO FORM 1503 (01.82) (P/401)